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Contractors involved in a weapon system acquisition, of course, perform the development and manufacturing work. The Department of Defense (DoD) Program Manager (PM) and personnel in the program office oversee the contractors and day-by-day do the myriad things that must be done for a major acquisition program to move forward—funding, contracting, and planning, among many others. Clearly, a good outcome for a program will not occur if these individuals do not do their jobs well. It is equally obviously that if the contractors and the government personnel do their jobs well, a good outcome for the program is more likely.

What this focus on the DoD PM, the program office personnel, and the contractors' PMs and workers leaves out are factors they must accept as "givens." These givens are subject to changes—sometimes large and fairly sudden—that presumably have substantial consequences for program outcomes. One of the givens is DoD acquisition policy and process. A second is the topline DoD budget constraint, which does not determine, but generally has a marked influence on, the funding for individual programs.

This paper summarizes the results of research done at the Institute for Defense Analyses[1] on whether, taking account of budget climate, changes in DoD acquisition policy and process had a discernible effect on growth of Program Acquisition Unit Cost (PAUC) of major defense acquisition programs (MDAPs). The paper attempts to shed some light on—and as it turns out, to challenge—three assumptions that often are implicit in discussions of acquisition reform:

- Cost growth and other problems of program outcome primarily reflect what does and perhaps does not take place in the acquisition realm.
- Changes in acquisition policy and process can be expected to have substantial effects on the cost, schedule, and performance results of MDAPs.
- The ingrained cultures of DoD acquisition organizations are a substantial obstacle to steps that might reduce cost growth.

While not organized around these topics, the paper provides results that bear directly on them.

Acquisition Regime and PAUC Growth

DoD acquisition policy and process over the period 1970–2007 can be grouped into five successive regimes:

1. The Defense Systems Acquisition Review Council (DSARC), 1970–1982
2. The Post-Carlucci Initiatives DSARC, 1983–1989
3. The Defense Acquisition Board (DAB), 1990–1993
4. Acquisition Reform (AR), 1994–2000
5. The DAB – Post Acquisition Reform, 2001–2007

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[1] David L. McNicol and Linda Wu, "Evidence on the Effect of DoD Acquisition Policy and Process on Cost Growth of Major Defense Acquisition Programs," IDA Paper P-5126. Alexandria, VA: Institute for Defense Analyses, 2014 (forthcoming). This paper was sponsored by the Director, Performance Assessments and Root Cause Analyses of the Office of the Under Secretary of Defense (Acquisition, Technology and Logistics.)

Table 1 displays the average PAUC growth for MDAPs that passed Milestone (MS) II/B or filed a first Selected Acquisition Report (SAR) in each of these regimes. The PAUC growth figures all are measured from the MS II/B baseline and normalized to the MS II/B total inventory objective. There are a number of interesting aspects to these data; for example, the high PAUC growth during the AR period and the lower PAUC growth for 2001–2007. Granting that, the single most notable feature of these data is the absence of any trend in PAUC growth. If changes in acquisition policy and process have had a sustained influence on PAUC growth, it does not show up in these data.

Broadly, there are two ways to explain the absence of sustained effects of acquisition policy and process on the PAUC growth data. First, they may in fact not have a strong or consistent effect on PAUC growth. Second, acquisition policy and process may have substantial effects that are masked by some other factor or factors.

Table 1. Average PAUC Growth in Successive Acquisition Regimes

Acquisition Regime	Time Period	Average PAUC Growth	No. of Observations
DSARC	1970–1982	32%	48
Post Carlucci Initiatives DSARC	1983–1989	19%	40
DAB	1990–1993	36%	11
Acquisition Reform (AR)	1994–2000	61%	27
DAB post AR	2001–2007	19%	25

Budget Climate and PAUC Growth

Thinking along the lines of the second of these possibilities led to consideration of whether changes in the DoD budget climate might be associated with PAUC growth. The period 1970–2007 includes two sub-periods during which the DoD topline was contracting or generally considered to be "tight": 1970–1978 and 1987–2001. It also includes two sub-periods in which the DoD topline was growing or thought to be "high": 1979–1986 and 2002–2007. Table 2 displays the average PAUC growth data for these four sub-periods.

Table 2. Average PAUC Growth in Different DoD Topline Conditions

DoD Topline Contracting or Tight		DoD Budget Growing or High	
Period	**PAUC Growth**	**Period**	**PAUC Growth**
1970–1978	37% (38)	1979–1986	12% (39)
1987–2001	51% (53)	2002–2007	10% (21)

Note: Numbers in parentheses are the number of observations available.

These data make it clear that the average PAUC growth in Contracting/Tight topline periods is far larger than it is in periods during which the topline was Growing/High—by a factor of three in the first comparison and by more than a factor of five in the second. This is clearly an effect potentially strong enough to mask other influences.

Acquisition Regime and Budget Climate

Table 3 expands Table 2 by replacing the budget climate sub-periods with the acquisition policy and process regimes. This table provides results for two sets of natural experiments. First, the PAUC growth columns give the effect of changes in the acquisition regime for a given budget climate. Second, the rows show the effect of budget climate for a given acquisition regime. For example, the first nine years of the DSARC (1970–1978) were in a tight budget climate, while the next four (1979–1982) were in a period in which the DoD topline was growing.

Table 3. Average PAUC Growth by Acquisition Regime and Topline Condition

	Topline Contracting/Tight		Topline Growing/High	
Acquisition Regime	**Period**	**PAUC Growth**	**Period**	**PAUC Growth**
DSARC	1970–1978	37% (38)	1979–1982	10% (10)
Post Carlucci DSARC	1987–1989	34% (11)	1983–1986	13% (29)
DAB	1990–1993	36% (11)	None	N/A
Acquisition Reform (AR)	1994–2000	61% (27)	None	N/A
DAB post AR	2001	66% (4)	2002–2007	10% (21)

Note: Numbers in parentheses are the number of observations available.

Statistical analysis of the averages in Table 3 leads to two conclusions. First, there is no statistically significant improvement or worsening of PAUC growth correlated with the different acquisition policy regimes. This is obvious for the Growing/High climate (column on the right in Table 3). In contrast, PAUC growth over 1994–2000 and in 2001 (column on the left in Table 3) is noticeably higher than the averages for previous periods, but the differences proved not to be statistically significant.

Second, PAUC growth tends to be substantially higher in a Contracting/Tight budget climate than in the Growing/High climate. We have only three natural experiments of changes in budget climate for a given acquisition regime, since two of the five acquisition regimes (DAB and AR) fall entirely within one budget climate—Contracting/Tight. Each of these three natural experiments on the effect of budget climate has the same outcome—moving from a Contracting/Tight budget climate to a Growing/High budget climate for a given acquisition regime is associated with much lower cost growth. The outcomes of the first two experiments are virtually identical—an average PAUC growth of 37 and 34 percent, respectively, in the two periods when the topline was Contracting/Tight and average PAUC growth of 10 percent and 13 percent, respectively, in the two periods when the topline was Growing/ High. The effect is most pronounced in the third experiment (DAB post-AR), which, with the first, is statistically significant.

There is a further important point in the data behind Table 3. PAUC growth is not a problem of the typical MDAP in periods of Contracting/Tight budget climate, but of the minority of MDAPs that experienced high cost growth. This conclusion rests primarily on three points:

- In periods of Contracting/Tight budget climate, about 40 percent of MDAPs had a PAUC growth of at least 50 percent.

- These MDAPS had an average PAUC growth of 92 percent, accounting for 78 percent of total PAUC growth.
- Average PAUC growth in these periods, excluding high cost growth MDAPs and MDAPS with negative PAUC growth, was 21 percent.

This conclusion is important because it suggests the possibility that reforms directed to the average or typical MDAP may miss the real source of the problem.

Does the Resource Allocation Process Play a Major Role in PAUC Growth?

These conclusions tend to challenge a fundamental assumption implicit in most discussions of acquisition reform: that the main, although not the only, causes of PAUC growth are to be found in the acquisition realm—the effectiveness of the PM, the adequacy of the developmental test plan, the reasonableness of the cost estimate, the completeness of the systems engineering plan, among many others. This assumption is hard to maintain when the many changes in acquisition policy and process made in the past four decades have not had statistically significant effects on PAUC growth, but there is a significant association between PAUC growth and budget climate at the point when the original baseline was set.

The association between PAUC growth and budget climate suggests that the resource allocation process, particularly at the Service level, plays an important role in cost growth. This does not mean "budget instability." Budget instability is a term of art for changes in MDAP funding through the annual resourcing cycle and "taxes." Budget instability is a chronic condition, present to some degree in all periods, and affects program execution but not problems of program inception. What this paper observed is a recurring pattern—that MDAPs that passed MS II/B during periods when the DoD topline was contracting or tight, on average, had much higher PAUC growth than those that passed MS II/B when the topline was growing or high.

The conjecture that the resource allocation process plays an important role in cost growth gets some support from an unexpected direction—MDAPs with negative cost growth, of which there are twenty-nine in our sample. Negative PAUC growth is recorded if the actual cost of a program proves to be less than the cost in the MS II/B baseline. Assuming the program was funded to its MS II/B baseline, this implies that over time funds can be taken from the program in question and reallocated to other applications, including other acquisition programs. The program, then, effectively can be used as a "bank"—a way to hold reserves in relative safety until they are needed. A bank of this sort is more likely to be needed in a Growing/High budget climate, as it can then serve as a way to delay final decisions on the higher level of funding that has become available. We would therefore expect to find relatively more instances of negative PAUC growth in the Growing/High budget periods, and this is what we observe. About 30 percent of our observations in Growing/High budget climates are of negative PAUCs, compared to about 10 percent across the periods of Contracting/Tight climate.

MDAPs with "high cost growth," which we define as quantity normalized PAUC growth of at least 50 percent, also suggest an influence from resource considerations. DoD resource managers, particularly at the Service level, have only a few tools for responding to a Contracting/ Tight budget climate. One of these is to impose top-down limits on the funding for particular MDAPs as they approach MS II/B. Plausibly, the result will be particularly optimistic programmatic and costing assumptions, which lead to an expectation that relatively more high cost growth programs will be started in periods of Contracting/Tight budget climate. This is what is observed. During periods of Contracting/Tight budget climate, about 40 percent of MDAPs

had very high PAUC growth. In contrast, during periods of Growing/High budget climate only about 7 percent of MDAPs experienced high PAUC growth.

Implications for Discussions of Acquisition Reform

This paper points to three implications for a discussion of acquisition reform. First, the relevant context for understanding PAUC growth is the interface between the acquisition process and the resource allocation process. The crucial evidence behind this point is the strong association between budget climate and PAUC growth. Resource managers must think in terms of a portfolio of programs across mission areas and commodity types, and extending from efforts in the technology base through programs nearing the end of production. When a program is completed, it opens a resource "hole" that programs emerging from Engineering and Manufacturing Development can occupy. In turn, programs earlier in the acquisition cycle can move forward as well. When funding for acquisition turns down, these holes get smaller, or close entirely, or require cuts in funding for ongoing programs. The alternatives available in this circumstance are all undesirable—cancellations of programs, delays in new starts, stretches, and unrealistic pricing. The evidence summarized here suggests that it is in this context that high PAUC growth arises.

Second, it seems unlikely that further broad changes in the acquisition process would have a major effect on PAUC growth. The research found no evidence that the efforts to strengthen the acquisition process through the years have resulted in lower or higher PAUC growth. This does not mean that the DAB process does not provide a useful discipline on acquisition programs; moreover, further changes in acquisition policy or process might be warranted for reasons of good government. The evidence does, at a minimum, suggest that the effects of changes in the acquisition process since the early 1970s have not had a dominant effect on PAUC growth.

Third, it is difficult to see that the cultures of the DoD acquisition organizations are a crucial obstacle to improved performance on cost growth. The key point to note is that high PAUC growth is not persistent, but rather episodic, and correlated with environmental factors outside of the control of the acquisition process. There is remarkably little PAUC growth in periods when the budget is Growing/High. It seems fair to ask if it makes sense to assert that an entrenched culture sometimes results in high cost growth and other times in low cost growth. Just how is it that the A team takes the field so quickly and quietly when the budgetary sun comes out? And why even in bad budgetary weather do more than half of MDAPs exhibit comparatively modest PAUC growth?

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14. ABSTRACT

This document summarizes the results of research on whether changes in Department of Defense (DoD) acquisition policy and process had a discernible effect on growth of Program Acquisition Unit Cost (PAUC) of major defense acquisition programs (MDAPs). Examination of PAUC growth data for 150 MDAPs that passed Milestone II or B during 1970–2007 does not reveal any substantial or consistent effect of changes in acquisition policy and process. Changes in budget climate, however, are found to have a large influence on PAUC growth. These findings have three implications for acquisition reform. First, the underlying cause of persistent high PAUC growth is not, as is commonly asserted, a deeply established culture of the DoD acquisition organizations and their professional employees. Second, it seems unlikely that further changes in the acquisition process will have a major effect on PAUC growth. Third, the relevant context for understanding PAUC growth is the interface between the acquisition process and the program/budget process.

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